Remarks

Entry of this Amendment, reconsideration of the application and allowance of all claims are respectfully requested. Claims 1-25 remain pending.

By this paper, independent claims 1, 8 & 20 are amended to more clearly point out and distinctly claims certain aspects of the present invention. These amendments are submitted in a *bona fide* attempt to further prosecution of this application. Support for the amended language can be found throughout the application as filed. For example, reference the example of pages 9-18 of the specification. Thus, no new matter is added to the application by any amendment presented.

In the Office Action, claims 1-8 & 20-24 were rejected under 35 U.S.C. §102(b) as being anticipated by Schuyler (U.S. Patent No. 5,832,526; hereinafter Schuyler), while claims 9-11 & 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schuyler in view of Steiner et al. (U.S. Patent No. 6,023,710; hereinafter Steiner), and claims 12-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schuyler in view of Steiner, and further in view of Kuo et al. (U.S. Patent No. 6,003,134; hereinafter Kuo). Each of these rejections is respectfully, but most strenuously, traversed to any extent deemed applicable to the claims presented herewith, and reconsideration thereof is requested.

In one aspect, Applicants' invention is directed to a technique for securely managing an arbitrary number of data files in non-volatile storage in order to restore data should abortion of a write operation occur (e.g., see claims 1, 8 & 20). The data is stored in a record oriented data structure with each of the records containing, in addition to the data content itself, a first reference indicating the current data-containing record of a previous file, and a second reference indicating the current data-containing record of a subsequent file. The write operation is a two-stage operation, and includes an update stage and an atomic write stage. During the update stage, multiple update operations are performed for a plurality of records employing the second references of at least some records of the plurality of records. After completion of the multiple update operations, the updates to the plurality of records are accepted in the atomic write stage. The atomic write stage employs the first references of the at least some records of the plurality of records. Thus, in Applicants' recited invention, a doubly-linked list is employed wherein the first references of the records link forward and facilitate the updates to the plurality of records,

and the second references of the records link backwards and facilitate the acceptance of the plurality of updates in a single atomic write stage, wherein each update is sequentially backwards accepted.

Advantageously, Applicants' record-oriented data structure with the doubly-linked list ensures that at all times during the write operation all the data files affected by the write operation contain either all the records stored prior to the write operation or all the data as modified subsequent to the write operation. In Applicants' approach, synchronicity of updates across records is guaranteed and a single atomic write stage is employed to finalize multiple updates to the plurality of records. Applicants' doubly-linked list structure provides a mechanism which allows data to be maintained as existing prior to an update operation until the single atomic write operation has been performed. This ensure the ability to recover from an interruption during the write operation.

It is well settled that there is no anticipation of a claim unless a single prior art reference discloses: (1) all the same elements of the claimed invention; (2) found in the same situation as the claimed invention; (3) united in the same way as the claimed invention; and (4) in order to perform the identical function as the claimed invention. In this instance, Schuyler fails to disclose various aspects of Applicants' invention as recited in independent claims 1, 8 & 20, as well as various dependent claims, and as a result, does not anticipate (or even render obvious) Applicants' invention.

Schuyler discloses a method and apparatus for using slack area of file storage structures for file reconstruction. The file-reconstruction data includes a unique end-of-file tag code positioned within a vital core section of limited length. The vital core section is located close to or against the end of the slack area. Less-essential file-reconstruction data is grown frontwards from the vital core section to the beginning of the slack area as room permits. During file recovery, the random access storage device is scanned for storage sub-areas containing the predefined, unique end-of-file tag code appropriately positioned within the vital core portion at the end of the sub-area. Each storage sub-area having such a properly-positioned end-of-file tag code is designated as a possible end-of-file sub-area. A file recovery program uses this and other available information to reconstruct the directory structure to whatever extent is made possible. (See Abstract of Schuyler.)

Although Schuyler describes various file recovery techniques, a careful reading of Schuyler fails to uncover any teaching or suggestion of a write operation approach such as recited by Applicants in the independent claims presented herein. Specifically, there is no teaching or suggestion in Schuyler of a record-oriented data structure within each of the records which contains, in addition to the data contents, a first reference indicating the current data-containing record of a previous file, and a second reference indicating the current data-containing record of a subsequent file. Applicants' recited record-oriented data structure is essentially a doubly-linked list, including both a backward reference to the current data-containing record of a previous file, and a forward reference to the current data-containing record of a subsequent file. With respect to these characterizations, the Office Action references (relative to original claim 6), column 16, line 67 – column 17, line 3 of Schuyler. This material states:

> The algorithm may additionally or alternatively record the next sub-area as being the probable first sub-area of a next file or file fragment or the beginning of free space or of a free space fragment.

Applicants respectfully submit that the Office Action mischaracterizes the teachings of Schuyler to the extent that the above-cited language is believed relevant to Applicants' recited record-oriented data structure (which includes, in addition to the data contents, a first reference indicating current data-containing record of a previous file, and a second reference indicating the current data-containing record of a subsequent file). The above-cited language from Schuyler does not teach or suggest to one skilled in the art a record-oriented data structure which includes a first reference indicating the current data-containing record of a previous file. There is simply no backward linking in the data structure described by Schuyler. Further, Applicants respectfully submit that a careful reading of Schuyler fails to uncover any express reference to even forward linking as recited by Applicants. In Applicants' recited invention, the record-oriented data structure includes a second reference which indicates the current data-containing record of a subsequent file. Schuyler's reference to a next sub-area is merely a "probable" first sub-area of a next file.

Still further, Schuyler does not teach or suggest provision of a write operation as recited by Applicants in the independent claims. In Applicants' write operation, a first update stage is employed, followed by a second atomic write stage. In the update stage, multiple write operations are performed for a plurality of records employing the second references of at least

some records of the plurality of records. After completion of the multiple update operations, Applicants' write operation accepts the updates to the plurality of records in one atomic write stage. The atomic write stage employs the first references of the at least some records of the plurality of records. Thus, in accordance with Applicants' write operation, there is a forward linked updating of the records, and a backward linked acceptance of the updates to the records. No similar functionality is believed taught or suggested by Schuyler or the other art of record.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of the anticipation rejection to the independent claims presented.

Further, Applicants respectfully submit that one of ordinary skill in the art would not have considered their claimed record-oriented data structure and two-stage write operation as obvious at the time this application was filed. An "obviousness" determination requires an evaluation of whether the prior art taken as a whole would suggest the claimed invention taken as a whole to one of ordinary skill in the art. In evaluating claimed subject matter as a whole, the Federal Circuit has expressly mandated that functional claim language be considered in evaluating a claim relative to the prior art. Applicants respectfully submit that the application of these standards to the independent claims presented lead to the conclusion that the recited subject matter would not have been obvious to one of ordinary skill in the art based on the applied patents.

For example, neither Steiner or Kuo is believed to teach or suggest a record-oriented data structure, wherein each of the records contains, in addition to the data contents itself, a first reference indicating the current data-containing record of a previous file, and a second reference indicating the current data-containing record of a subsequent file.

Still further, Applicants respectfully submit that neither Steiner or Kuo teaches or suggests a two-stage write operation as recited by Applicants wherein the second references are employed during an update stage, and the first references are employed during an atomic write stage. In accordance with Applicants' write operation, the data files affected by the write operation contain either all the data stored prior to the write operation, or all the data as modified subsequent to the write operation. No similar functionality is believed taught or suggested by Schuyler, Steiner or Kuo, either alone or in combination.

The dependent claims are believed allowable for the same reasons as the independent claims, as well as for their own additional characterizations.

All claims are believed to be in condition for allowance and such action is respectfully requested.

Should the Examiner have any questions regarding this application, Applicants' attorney is available by telephone at the below-listed number.

Respectfully submitted,

Kevin P. Radigan

Kevin P. Radigan
Attorney for Applicants
Registration No.: 31,789

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HESLIN ROTHENBERG FARLEY & MESITI P.C.
5 Columbia Circle
Albany, New York 12203-5160
Telephone: (518) 452-5600
Facsimile: (518) 452-5579